

FIRST DATA ON ORTHOPTERA OF MOUNT KÖROĞLU, N.W. ANATOLIA, WITH DESCRIPTION OF THREE NEW TAXA¹

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ABSTRACT: The Orthoptera fauna of the alpine zone of Mount Köroğlu, which includes 12 species and subspecies, is studied for the first time. One new genus (*Koroglus*), one new species (*Koroglus disparalatus*), and one new subspecies (*Paranocaracris rubripes demirsoyi*) are described. Keys are included to distinguish them from related taxa. Illustrations of the most important features of the endemic species are included herein.

This paper is based on material collected from alpine zone of Mount Köroğlu in Bolu Province, the Batıkaradeniz (West Black Sea) Region of Turkey. Compared with other parts of Turkey, the Orthoptera fauna of the Batıkaradeniz Region is rather poorly studied. Sixty-nine species have been recorded in various papers from the Region (Uvarov, 1934; Karabağ, 1958, 1974; Weidner, 1969; Demirsoy, 1977; Tutkun, 1981; Gümüşsuyu, 1981; Ünal, 1999).

Köroğlu, the highest mountain in the Province, is in southeastern Bolu. It is situated between the cool, humid, rainy Batıkaradeniz Region and the hot, dry Middle Anatolia Region of Turkey. The Mountain has two peaks, Köroğlutepe (2400 m) and Kartaltepe (Kartalkaya) (2100 m). The vegetation is mostly alpine meadows, covering 70-95% of the area. *Festuca* sp. is the predominant species, but the following plants are also present; *Epedra* sp., *Circium boluense*, *Daphne pontica*, *Crocus speciosus*, *Juncus* sp., *Rumex* sp., *Astragalus* sp., *Tymus* sp., *Verbascum* sp., *Asperula* sp., *Gentiana* sp. and *Viola* sp. The alpine zone is bordered by *Pinus sylvestris* forest. The geographic coordinates for the two peaks are as follows: Köroğlutepe 40°30' N, 31°51' E and Kartaltepe 40°34' N, 31°46' E.

When the field studies began on 1st July 2000, most of the Orthopteran specimens were nymphs. After that date, 606 specimens were collected belonging to 8 genera, 12 species and subspecies. Of these, one genus (*Koroglus*), one species (*Koroglus disparalatus*) and one subspecies (*Paranocaracris rubripes demirsoyi*) are new, and two species, *Isophya rectipennis* Br.-W. and *Stenobothrus nigromaculatus* (Herrich-Schaffer), are recorded from Bolu Province for the first time. New data on the morphology of the endemic species are given. Five species and subspecies (*Isophya rectipennis* Br.-W., *Poecilimon bosporicus* Brunner von Wattenwyl, *Poecilimon cervus* Karabağ, *Koroglus disparalatus* new species and *Paranocaracris rubripes demirsoyi* new subspecies) are endemic for Turkey.

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Holotypes of new taxa are deposited in the Centre for Entomological Studies Ankara (CESA). All others in the Entomological Museum of Abant İzzet Baysal University (EMAİBU).

MATERIALS AND METHODS

The specimens were captured by net between July and October, 2000. 606 specimens were collected in 6 trips and prepared as museum material using standard methods. Male genitalia of new taxa were dissected and macerated in 10% KOH solution. All drawings were made by drawing attachment with mirror on stereo microscope. After illustration, genitalia were glued to cards pinned with the appropriate specimen. Specimens were determined using the literature and compared with materials in the Collection of Centre for Entomological Studies Ankara (CESA), the Zoological Museum of Ankara University (ZMAU) and the Entomological Museum of Abant İzzet Baysal University (EMAİBU). Terminology follows Karabağ (1951), Mistshenko (1951) and Harz (1969, 1975).

SPECIES WITH THEIR DATA AND TAXONOMIC DESCRIPTIONS

Tettigonioidae: Tettigoniidae: Phaneropterinae

Isophya Brunner von Wattenwyl, 1878

Isophya rectipennis von Wattenwyl, 1878

Figs. 1-6.

Isophya rectipennis von Wattenwyl, 1878, Monog. Phanerop., p. 69.

Material studied. Bolu Prov., Kartaltepe, 1950-2050 m, 1 July 2000, 1 male (nymph), 1 female (nymph); 13 July 2000, 10 males; 4 August 2000, 2 males, 4 females; 5 October 2000, 1 female; Köroğlutepe, 2200 m, 9 August 2000, 1 male, 1 female; 5 km N. of Kartaltepe, 1700 m, 9 September 2000, 2 females; 5 km. N.W. of Tembel yaylastı, 1800 m, 9 August 2000, 1 female.

Distribution. N.W. Anatolia. Known from Romania, Bulgaria and N. W. Turkey (Ramme, 1951; Karabağ, 1958; Bei-Bienko & Mistshenko, 1951; Harz, 1999). New for Bolu Province.

Remarks and distinctive characters. This species lives on *Festuca* sp. and *Verbascum* sp. Fastigium of vertex slightly narrower than antennal scape; with rounded apex; not projecting between the antennal scapes. Cercus and subgenital plate variable in males. Cercus (Figs. 1 and 2) relatively straight; incurved in apical fifth, in some males more curved inwards; with short apical tooth, regularly tapering to apex. Male subgenital plate (Figs. 3-5) longer than wide; posterior margin with narrow triangular incision, its apical lobes tapered and triangular, in some males with more rounded posterior incision and apical lobes (Figs. 4, 5). Ovipositor (Fig. 6) relatively narrowed posteriorly; serrate part not broad.

Poecilimon Fischer, 1853

Poecilimon bosphoricus Brunner von Wattenwyl, 1878

Figs. 7-9.

Poecilimon bosphoricus Brunner von Wattenwyl, 1878, Monog. Phanerop., p. 43.

Material studied. Bolu Prov., 1 km N. of Kartaltepe, 1900 m, 13 July 2000, 5 males 8 females; 4 August 2000, 1 male.

Distribution. Known only from N.W. Anatolia. Recorded from Bolu Province by Tutkun (1981) and Ünal (1999).

Remarks and distinctive characters. This species has been found on *Urtica* sp. which grows on the border of alpine zone. In males, metazona of pronotum more raised than typically. Subgenital plate (Fig. 7) with broad incision; lateral margins rounded, in some males with a narrow incision and lateral margins not rounded. Cercus (Fig. 8) with 8-11 small apical denticles which are very dense, in some males larger and sparse; with a large dorsal denticle. Ovipositor as in Fig. 9.

Poecilimon cervus Karabağ, 1950

(Figs. 10-13)

Poecilimon cervus Karabağ, 1950, Proc. R. Ent. Soc. London, (B) 19:153.

Material studied. Bolu Prov., 1 km N. of Kartaltepe, 1900 m, 4 August 2000, 3 males, 5 females; 5 km N.W. of Tembel yaylası, 1800 m, 9 August 2000, 1 male.

Distribution. Known only from N.W. Anatolia. Recorded from Bolu Province by Karabağ (1964) and Ünal (1999).

Remarks and distinctive characters. This species has been found on *Urtica* sp. which grows on the border of alpine zone. Metazona of pronotum (Fig. 10) raised; apical branch of male cercus (Fig. 13) distinctly shorter than typically, inner branch only weakly widened at apex, with 4 apical denticles; male subgenital plate (Fig. 12) not widened posteriorly, with round incision, its lobes shorter and thicker than typically. First valvifer of ovipositor (Fig. 11) less curved apically.

Tettigoniinae

Anterastes Brunner von Wattenwyl, 1882

Anterastes serbicus Brunner von Wattenwyl, 1882

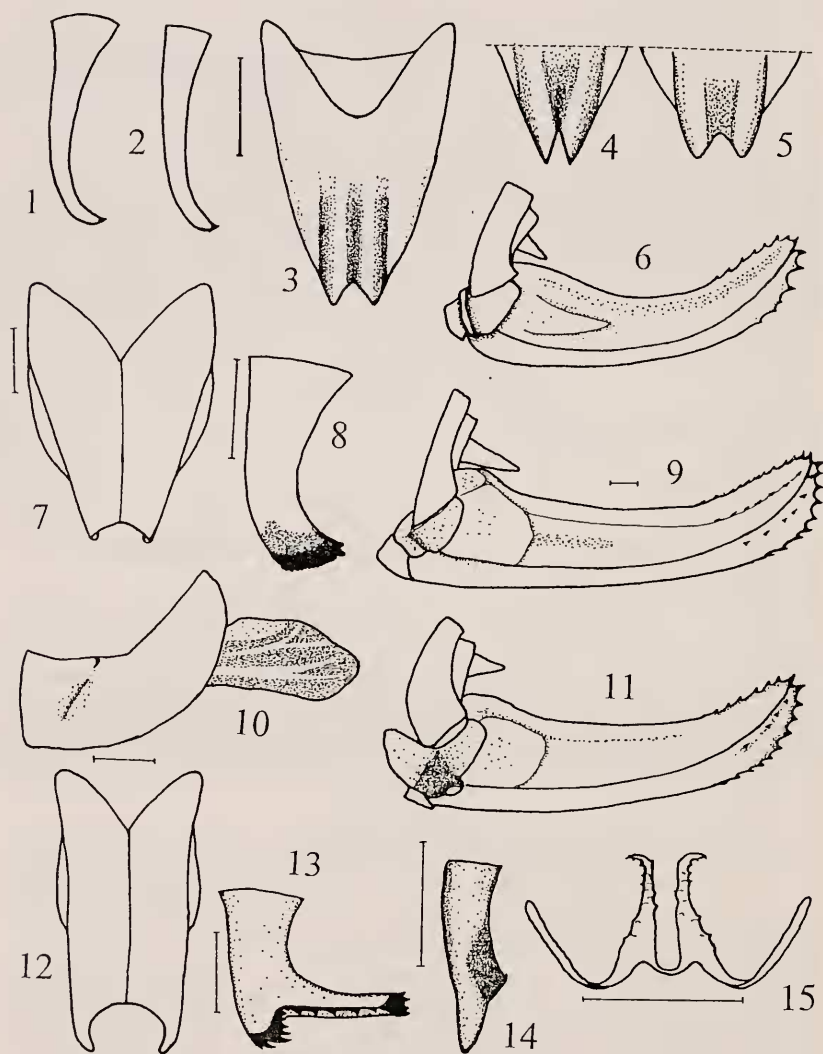
Figs. 14-15

Anterastes serbicus Brunner von Wattenwyl, 1882, Prodr. Eur. Orth., p. 329.

Material studied. Bolu Prov., Kartaltepe, 1950-2050 m, 1 July 2000, 2 males (nymphs), 7 females (nymphs); 13 July 2000, 27 males, 11 females, 2 males (nymphs), 18 females (nymphs); 4 August 2000, 10 males, 8 females; 9 September 2000, 8 males, 4 females; Koroğlu-tepe, 2200 m, 9 August 2000, 9 males, 13 females; Tembel yaylası, 2000 m, 9 August 2000, 5 males, 4 females.

Distribution. Known from S. Balkan peninsula and W. Anatolia. In Bolu Province recorded from Gerede by Karabağ (1958).

Remarks and distinctive characters. This species lives on *Festuca* sp. The population density is very high. Male cercus (Fig. 14) depressed dorso-ventrally in the middle. Apical arms of titillator (Fig. 15) rough; its apices excurved. Ovipositor long, weakly upcurved, in some females more curved upwards.



Figs. 1-6. *Isophya rectipennis* Br.-W.: 1 and 2, male left cercus; 3, male subgenital plate; 4 and 5, posterior part of male subgenital plate; 6, ovipositor. Figs. 7-9. *Poecilimon bosporicus* Br.-W.: 7, male subgenital plate; 8, male left cercus; 9, ovipositor. Figs. 10-13. *Poecilimon cervus* Karabağ: 10, male pronotum and tegmina, lateral view; 11, ovipositor; 12, male subgenital plate; 13, male left cercus. Figs. 14-15. *Anterastes serbicus* Br.-W.: 14, male left cercus; 15, titillator. Scales 1 mm.

Koroglus, NEW GENUS

(Figs. 16-29)

Type species: *Koroglus disparalatus* new species, here designated.

Description. Body size small for the subfamily. Pronotum (Figs. 16 and 17), longer than left tegmen; without median keel; hind margin truncate. Tegmina (Figs. 16 and 17) micropterous in male; always right tegmen longer than left; in female squamipterous. Prosternum unarmed. Fore tibia with 3 spines on the outer margin of dorsal surface. Tympanal organ thin, slit-like. Hind tibia with two apical spurs ventrally, inner one clearly longer than outer one. Plantula shorter than metatarsus. Hind femur distinctly shorter than body length, always longer than ovipositor. Abdomen cylindrical and relatively elongate; tenth tergite (Fig. 18) with acute projections in male. Male cercus (Figs. 18, 19, 20 and 21) cylindrical, not depressed dorso-ventrally (Fig. 22); with a large, apical internal tooth; its apex not curved outwards. Subgenital plate (Fig. 23) longer than wide, with small styli; subgenital plate of female (Fig. 28) with a large median incision; its surface smooth, without carina. Titillators (Figs. 24, 25 and 26) fused; apices of apical arms curved backwards; basal arms curved toward both sides. Ovipositor (Fig. 29) distinctly upcurved and strongly narrowing posteriorly; shorter than hind tibia, hind femur and body; nearly two times as long as pronotum.

Diagnosis. The new genus easily recognizable by the structure of titillator, male cercus, unequal of right and left tegmina, the shape of the short ovipositor and the short hind legs. The male last abdominal tergite and the subgenital plate of both sexes are similar to *Anterastes* Brunner von Wattenwyl, but differs from it in the shape of titillator, male cercus, and the peculiar unequal length of the male tegmina and the structure of ovipositor.

Etymology. The genus name is derived from "Köroğlu" Mountain, the type locality of the only known species of this new genus. This mountain also was named after Köroğlu. He was a poet and folk hero who had lived in these mountains in the 16th century.

Koroglus disparalatus, NEW SPECIES

(Figs. 16-29)

Type locality. Bolu Province, Köroğlu Dağı, Kartaltepe, 1950-2050 m, 4 August 2000. Holotype deposited in the Centre for Entomological Studies Ankara (CESA).

Description. Male (holotype). **Head:** Fastigium of vertex with rounded apex; as wide as antennal scape. Eye narrower than the largest part of fastigium. **Thorax:** Pronotum (Figs. 16 and 17) cylindrical anteriorly, posterior portion slightly flattened; anterior margin weakly concave, posterior margin almost straight, in some males slightly convex; dorsal surface with transverse sulcus, 0.2 mm behind middle of disk; pronotum longer than left tegmen and mostly shorter than right tegmen. Tegmina (Figs. 16 and 17) with distinct longitudinal veins; right tegmen longer than left, reaching to end of 3rd abdominal tergite, in some males longer; left tegmen reaching half of the 3rd tergite, beyond in some males; basal part of costal area without veins; medial, radial and apical part of costal area with irregular transverse veins. Stridulatory file 1 mm long, with 54 lamelliform teeth; mirror on right tegmen irregular hexagonal, almost rounded. Hind legs relatively short. Hind tibia with spines variable in size. Basal part of hind femur longer than narrowed apical part, without spines.

Abdomen. Posterior half of last 3 tergites (Fig. 22) hairy dorsally. Tenth tergite (Fig. 18) with a very deep round incision, its lobes long and acute. Cercus (Figs. 18 and 19) almost straight; slightly incurved to apex; inner tooth situated distally, not curved downwards; tip of cercus al-

most triangular, not excurved and about as long as inner tooth, in other males with variable in size (Figs. 20 and 21); basal part of cercus broad; narrowed in the middle; the connection part of inner tooth swollen (Fig. 22). Subgenital plate (Fig. 23) with a deep acute angular incision; styli shorter than depth of median incision. Arms of titillator (Figs. 24, 25 and 26) with long apical portion, outer margin with rough surface, basal half strongly widened anteriorly; their apices thin, curved backwards at right angle, pointed with downcurved, small, single tooth; basal arms very short and upcurved.

Female. Head as in male. Pronotum cylindrical; anterior margin slightly convex, posterior margin truncate, in some individuals slightly concave; lateral view as in Fig. 27; transverse sulcus 0.3 mm behind the middle. Tegmen scale like, positioned laterally (Fig. 27); not reaching to proximal 1/3 of first abdominal tergite, in some females fully concealed under the pronotum. Abdomen cylindrical; its tergites not hairy. Cercus (Fig. 29) narrow slightly incurved at apex. Subgenital plate (Figs. 28 and 29) broader than long, with a large rounded triangular incision which is slightly wider than deep. Ovipositor (Fig. 29) short, nearly half of body length; clearly shorter than hind femur and hind tibia; basal portion broad, strongly narrowing to apex, distinctly upcurved, in some females less curved.

Coloration. Body dark, black and brown colors predominant. Face brown, partly blackened, in female darker; vertex with 3 light stripes, partly black and brown between them. Antennae light brown, flagellum with black rings; scape and pedicel dark brown or black. Disk of pronotum brown; lateral lobes black, ventral edges bordered by light band. Tegmina dark yellow. Fore leg brown with black spots; dorsal surface of tympanal organ and anterior surface of foretibia with black stripes. Middle leg brown, femur with black spots. Hind femur with large black stripes, genicular lobe slightly darkened, other parts brown or cream. Hind tibia with black stripes ventrally; dorsal spines with black tips. Tarsus contrastingly darker than tibia. Abdominal tergites black, with narrow light band posteriorly; dorsal surface with two broad brown bands. All sternites cream, green or pale yellow. Basal portion of male subgenital plate with black stripes laterally. Apical part of male cercus dark. Ovipositor light greenish or cream brown, with two short black stripes basally in dorsal view.

Nymph. Body cylindrical and black. Head with a thin light stripe dorsally. Lower margin of pronotum with light band laterally. Fore and middle legs dark brown. Apical part of hind femur with a distinct orange ring. Hind legs short. Male cercus short and straight, tapering to tip; with a very indistinct process inner side apically. Subgenital plate similar to adult but small. Ovipositor thick and short; upper valve longer than lower valve; strongly tapering to tip.

Measurements. (mm). length of body: male 10.7-14.8, female 10.9-15; pronotum: male 3.3-3.9, female 3.4-4; left tegmen: male 2.8-3.8, right tegmen: male 3.1-4.8; hind femur: male 8.5-10, female 9.7-11.3; ovipositor: 6.2-7.5.

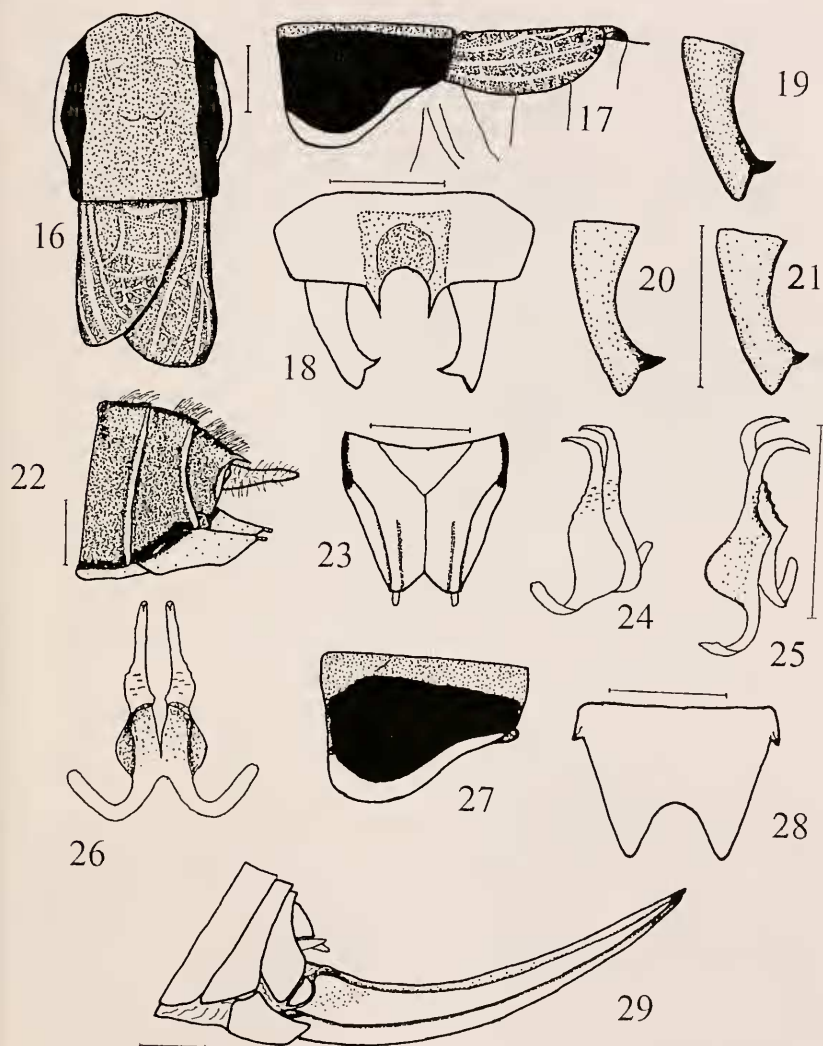
Type Material. Bolu Province, Koroğlu Dağı, Kartaltepe 1950-2050 m, 1 July 2000, 3 males (nymphs) 3 females (nymphs); 13 July 2000, 6 males 2 females, 3 males (nymphs) 4 females (nymphs); 4 August 2000, 30 males 20 females (including holotype), 2 males (nymphs) 4 females (nymphs); 9 September 2000, 6 males 3 females; 5 October 2000, 1 male 1 female; Koroğlutepe 2200 m, 9 August 2000, 2 males 1 female.

Etymology. This species name is derived from the Latin "*disparalatus*", unequal winged.

Remarks. This new species lives on *Festuca* sp. only above 1950 m on Mount Koroğlu.

Key to *Tettigoniinae* of Europe and West Asia related to *Koroglus*, new genus

Modified from Harz (1969). These genera are characterized by the presence of two apical spurs on the ventral surface of the hind tibia.



Figs. 16-29. *Koroglus disparalatus* n.gen. et n.sp: 16, male pronotum and tegmina, dorsal view; 17, ditto, lateral view; 18, male last tergite and cerci, dorsal view; 19, male left cercus; 20 and 21 male left cerci in paratypes; 22, male end of abdomen, lateral view; 23, male subgenital plate; 24, titillator; 25 and 26, titillators in paratypes; 27, female pronotum and tegmina, lateral view; 28 female subgenital plate; 29, ovipositor. Scales 1 mm.

1. Plantula of hind tarsus as long as metatarsus *Rhacocleis* Fieber
- Plantula of hind tarsus shorter than metatarsus 2
2. Male cercus with internal tooth (Fig. 19) 3
- Male cercus without internal tooth *Yersinella* Ramme
3. Pronotum strongly extended posteriorly *Thyreonotus* Serville
- Pronotum never extended posteriorly (Fig. 17) 4
4. Prosternum with two projections or warts. Male cercus
strongly flattened on the internal surface *Antaxius* Brunner von Wattenwyl
- Prosternum without projections. Male cercus not flattened on the internal surface 5
5. Metazona of pronotum with median keel 6
- Pronotum without median keel (Fig. 16) 7
6. Tenth tergite of male with two elongate apical processes.
Ovipositor 7 mm long, thick and slightly upcurved *Sureyaella* Uvarov
- Tenth tergite of male without apical processes. Ovipositor
4.2-5.2 mm long, thin and distinctly upcurved *Miramiola* Uvarov
7. Male right tegmen distinctly longer than left (Fig. 16). Arms of titillator
recurved at apex (Fig. 26). Male cercus not depressed dorso-ventrally,
swollen near internal tooth (Fig. 22). Ovipositor 6.2-7.5 mm long,
strongly upcurved and sharply pointed backwards (Fig. 29) *Koroglus* new genus
- Male right tegmen as long as left one. Arms of titillator curved laterally
on both sides (Fig. 15). Male cercus depressed dorso-ventrally near
internal tooth (Fig. 14). Ovipositor at least 10 mm long, slightly
upcurved and gradually narrowed backwards *Anterastes* Brunner von Wattenwyl

Acridoidea: Pamphagidae: Pamphaginae

Paranocaracris Mistshenko, 1951

Paranocaracris rubripes (Fischer de Waldheim, 1846)

Nocarodes rubripes Fischer de Waldheim, 1846, Orth. Ross., p.270.

Paranocaracris rubripes demirsoyi, NEW SUBSPECIES

(Figs. 30-42)

Type locality. Bolu Province, Koroğlu Dağı, Kartaltepe, 1950-2050 m, 13 July 2000. Holotype deposited in the Centre for Entomological Studies Ankara (CESA).

Description. Female (holotype). Body cylindrical, depressed dorso-ventrally. **Head:** Head (Figs. 30 and 31) relatively small. Frontal ridge gradually diverging towards the clypeus. Vertex (Fig. 31) broad, slightly horizontal; its width between the eyes greater than the vertical diameter of the eye. Fastigium forming a right angle with frontal ridge in lateral view (Fig. 30). Length of eye same distance as anterior margin of eye to frontal ridge in profile. Occiput with a distinct carina with a median groove in the middle and irregular lateral carinae. Antennae shorter than head and pronotum together; with 12 segments, in other females with 13 segments. **Thorax:** Pronotum (Figs. 30 and 31) not intersected by the transverse groove; anterior and posterior part slightly convex, more straight between them in lateral view; with distinct lateral and median carinae; median carina with distinct median groove only in anterior portion, then sharply narrowed to posterior margin. Pronotum broader than long; anterior margin distinctly convex, posterior margin almost straight. Prosternal process a blunt tubercle (Fig. 32). Mesosternum with trapezoidal lobes, their inner lateral margin sharply bent at an angle; the widest part of mesosternal lobe clearly more than its length. Metasternum broad; its widest part more than the length of meso- and metasternae together; with strongly projected anterior median process in the mesosternal field. Body apterous. Fore and middle tibia with 6-7 spines on each row ventrally. Hind femur (Fig. 33) with small denticles along the dorsal margin; dorsal lobe slightly raised. Hind tibia with 9 spines inside, with 10-11 spines outside dorsally (Figs. 35 and 36); with four apical spurs.

Arolia small, not reaching to half of claws (Fig. 34). **Abdomen:** Abdominal tergites not raised; median projections atrophied, not extending beyond posterior margins; with moderately distinct median and lateral carinae. Tympanum absent (Fig. 37). Supra anal plate with a distinct median groove, its anterior part wide, narrowed to apex. Cercus broad only a little longer than wide. Ovipositor stout, only apical part of upper valve slightly upcurved.

Male. As female but smaller. Antennae almost as long as length of head and pronotum together. Frontal ridge (Fig. 38) nearly elliptical in dorsal half, below median ocellus sharply diverging towards clypeus. Pronotum (Fig. 39) convex. Prosternum with a very sharp projection (Fig. 40). Meso- and metasternae as in Fig. 41. Abdominal tergites as in Fig. 39. Tympanum absent. Supra anal plate without groove, its surface smooth. Cercus clearly longer than wide. Subgenital plate with smooth surface. Genitalia as in Fig. 42.

Coloration. Female colorful. Body greenish brown, with black, red, yellow, cream and blue. Head with red and greenish blue spots; male head brown with black spots. Pronotum with black spots, in male as on head; anterior and posterior margins of pronotal lobes with light band. Fore and middle legs yellow and cream; with green, greenish blue, red and black spots and stripes, in male brown. Hind leg with more than 3 different colors (Figs. 33, 34, 35 and 36). Inner surface of hind femur (Fig. 33) black with a distinct red band along upper side; upper genicular lobe with green or greenish blue spots, male hind femur with black inner aspect with a more indistinct red band dorsally. Hind tibia with fully black inside (Fig. 36); between both rows of dorsal spines dark blue or green with a big red spot apically (Fig. 34); outer surface (Fig. 35) yellow with some green spots; bases of outer dorsal spines yellow, with black tips; apical spurs entirely black; in male inner surface of hind tibia black, outer surface light but tips of dorsal spines black. Tarsus bright red; claws black (Fig. 34); male tarsus dark red; male abdomen brown, blackened laterally.

Nymph. Body laterally compressed. Pronotum distinctly shorter than its depth; median carina with longitudinal groove. Colors of hind femur, hind tarsi and internal surface of hind tibia as in adult, external surface darkened.

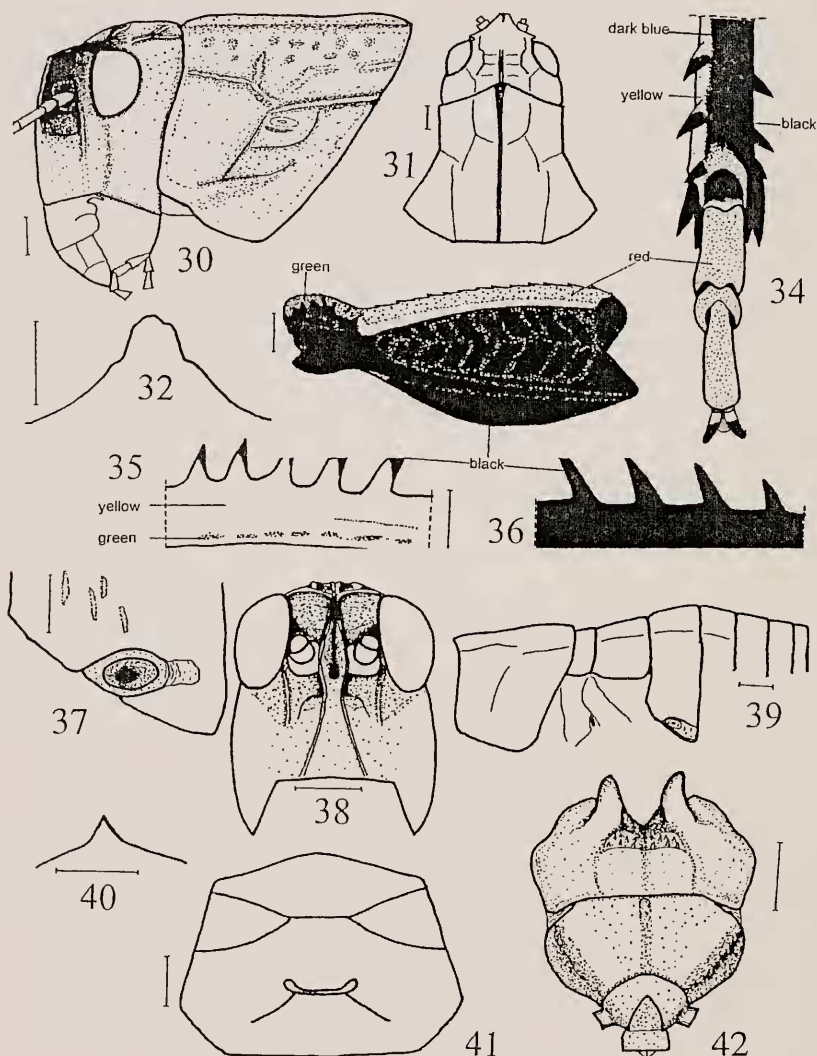
Measurements (mm). length of body: male 19.9-21.3, female 39.8-43; pronotum: male 4.7, female: 6.7-8; hind femur: male 9-9.8, female 13.4-14.1; hind tibia: male 8-8.2, female 11.4-11.5.

Type Material. Bolu Province, K ro lu Da ı, Kartaltepe, 1950-2050 m, 1 July 2000, 1 female, 1 female (nymph); 13 July 2000, 1 female (holotype), 1 male (nymph), 1 female (nymph); 9 September 2000, 1 female; 5 October 2000, 2 males, 3 females (nymphs).

Diagnosis. This new subspecies is easily distinguished from all known subspecies of *Paranocaracris* Mistshenko by the colors of the hind leg and the shape of male genitalia. It is similar to *P. rubripes burri* (Uvarov) from Uluda  but differs from it by the shape of frontal ridge and the genitalia of male, the color of hind tibia, the absence of the red stripe of hind femur ventrally. Differs from *P. rubripes bodenheimeri* (Uvarov) from Elmada  by the depressed body dorso-ventrally, the absence of the transverse light band inner surface of the hind femur apically, the presence of the red band along the inner dorsal margin of the hind femur and the coloration of the hind tibia.

Etymology. The subspecies is named in honor of Prof. Dr. Ali Demirsoy who has revised the Turkish *Pamphaginae*. In addition, he has valuable publications, particularly in *Caelifera*.

Remarks. The new subspecies has been found among stones on *Astragalus* sp., above 1950 m on Mount K ro lu. *P. rubripes* (Fischer de Waldhein) contains seven subspecies in Anatolia, Caucasus and Iran (Stolyarov, 1997).



Figs. 30-42. *Paranocaracris rubripes demirsoyi* n.ssp.: 30, female head and pronotum, lateral view; 31 ditto, dorsal view; 32, projecting of female prothorax; 33, female hind femur, inner face; 34, female tarsus and apical part of hind tibia, dorsal view; 35, a part of outer face of hind tibia in female; 36, ditto, inner face; 37, female tympanal area and stigma; 38, male head, anterior view; 39, male pronotum and abdomen, lateral view; 40, projecting of male prothorax; 41, male meso- and metasternae; 42, male genitalia. Scales 1 mm.

Of these, six subspecies occur in Turkey (Demirsoy, 1973, 1977). *P. rubripes rubripes* (Fischer de Waldheim) known from N.E. Anatolia, Caucasus and Iran. *P. rubripes tristis* (Ramme) occurs only in Georgia. All others known from N. and E. Turkey. Mostly, the coloration of the hind legs, one of the most distinctive characters, has been used for the identification (Uvarov, 1949; Ramme, 1951; Bei-Bienko & Mistshenko, 1951; Demirsoy 1973 and 1977; Weidner, 1969). Although the characters of the male genitalia were used by Ramme (1951) for the identification of *Pamphaginae* species, it was not used by Uvarov (1949), Bei-Bienko & Mistshenko (1951) and Demirsoy (1973, 1977). Weidner (1969) illustrated the male genitalia only for *P. rubripes* (Fischer de Waldheim).

Key to the subspecies of *Paranocaracris rubripes* (Fischer de Waldheim)
Modified from Demirsoy (1973 and 1977).

1. Hind legs with more than 3 different colors (black, yellow, red, blue and green) (Figs. 33, 34, 35 and 36). Inner surface of hind femur with a red band along upper side (Fig. 33). Male genitalia as in Figure 42 ... *demirsoyi* new subspecies
- Hind legs at most with 3 different colors. Inner surface of hind femur without red band along upper side. Male genitalia as in Ramme, 1951: 293-294 2
2. Hind tibia light red, orange or yellow 3
- Hind tibia darkened with black, red, blue or green 4
3. Inner face of hind femur black, sometimes with light band apically *burri* (Uvarov)
- Inner face of hind femur yellow or yellowish-green *acinosus* (Mistshenko)
4. Outer dorsal spines of hind tibia fully black *rubripes* (Fischer de Waldheim)
- Outer dorsal spines of hind tibia not fully black, at least with light band in the middle part 5
5. Inner face of hind femur black with white band apically. Hind tarsus yellow *bodenheimeri* (Uvarov, 1940)
- Inner face of hind femur black without white band apically. Hind tarsus red or black 6
6. Hind tibia unicolored entirely 7
- Basal 2/3 part of hind tibia black, apical 1/3 red *subrubrata* (Ramme)
7. Hind tibia and tarsus dark red *tristis* (Ramme)
- Hind tibia and tarsus black; sometimes hind tarsus red *rigidus* (Mistshenko)

Acrididae: Gomphocerinae

***Stenobothrus* Fischer, 1853**

***Stenobothrus (Stenobothrus) lineatus* (Panzer, 1796)**

Gryllus lineatus Panzer, 1796, Faun. Ins. Germ. fasc., p.33.

Material studied. Bolu Prov., K ro  lutepe, 2000-2200 m, 9 August 2000, 11 males, 15 females.

Distribution. Distributed from Europe to Middle Asia. Recorded from Bolu Province by  nal (1999).

***Stenobothrus (Stenobothrus) nigromaculatus nigromaculatus*
(Herrich-Schaffer, 1840)**

Acridium nigromaculatus Herrich-Schaffer, 1840, Nomenc. Ent. 2, Orth., p.10, 11.

Material studied. Bolu Province, Kartaltepe, 1950-2050 m, 1 July 2000, 1 male (nymph) 7 females (nymphs); 13 July 2000, 26 males 15 females, 3 females (nymphs); 4 August 2000, 17 males 8 females; 9 September 2000, 5 males 24 females; 5 October 2000, 1 male 8 females; K ro lutepe, 2200 m, 9 August 2000, 1 male 9 females; Tembel yaylası, 2000 m, 9 August 2000, 6 males 5 females.

Distribution. Known from S. Europe to S. Siberia. New for Bolu Province.

Omocestus Bolivar, 1878

Omocestus (Dirshius) haemorrhoidalis haemorrhoidalis (Charpentier, 1825)

Gryllus haemorrhoidalis Charpentier, 1825, Hor. Ent., p. 165.

Material studied. Bolu Prov., Kartaltepe, 1950-2050 m, 9 September 2000, 5 males 1 female; 5 October 2000, 1 male; K ro lutepe, 2000-2200 m, 9 August 2000, 2 males 1 female; 5 km N. of Kartaltepe, 1700 m, 9 September 2000, 7 males 9 females; 5 km N.W. of Tembel yaylası, 1800 m, 9 August 2000, 2 males 1 female.

Distribution. Distributed from S. Europe to Kazakhstan. Recorded from Bolu Province by Weidner (1969) and  nal (1999).

Chorthippus Fieber, 1852

Chorthippus (Glyptobothrus) apricarius (Linnaeus, 1758)

Gryllus Locusta apricarius Linnaeus, 1758, Syst. Nat. (ed.10), p. 433.

Material studied. Bolu Prov., Kartaltepe, 1950-2050 m, 4 August 2000, 2 males 3 females; 9 September 2000, 4 males 8 females; K ro lutepe, 2200 m, 9 August 2000, 18 males 19 females; Tembel yaylası, 2000 m, 9 August 2000, 22 males 17 females, 2 female (nymphs); 5 km N. of Kartaltepe, 1700 m, 9 September 2000, 5 males 10 females.

Distribution. Widely distributed from Europe to China. Recorded from Bolu Province by Weidner (1969) and  nal (1999).

Chorthippus (Glyptobothrus) brunneus (Thunberg, 1815)

Gryllus brunneus Thunberg, 1815, Mem. Acad. Petersb., 5:249.

Material studied. Bolu Prov., Kartaltepe, 1950-2050 m, 13 July 2000, 1 female; 9 September 2000, 3 males 2 females; 5 October 2000, 2 males; 5 km N. of Kartaltepe, 1700 m, 9 September 2000, 1 male 2 females.

Distribution. Distributed from Europe to N. China (?). Recorded from Bolu Province by  nal (1999).

Remarks. Ragge et al. (1990) suggested that *C. brunneus* is not distributed in southern part of Balkan peninsula, based on the acoustic study of *Chorthippus biguttulus* group. Previous records were actually based on *C. bornhalmi* Harz or another unknown species from southern Balkans (Ragge et al, 1990). Morphologically, the specimens collected from Mount K ro lu, are nearer to *C. brunneus* than *C. bornhalmi*. Individuals of this group are common in Turkey and recorded in the species *C. brunneus* Thunberg, *C. biguttulus* Linnaeus and *C. mollis* Charpentier. Turkish species should be reappraised using their songs.

***Chorthippus (Glyptobothrus) biguttulus euhedicki* Helversen, 1989**

Chorthippus (Glyptobothrus) biguttulus euhedicki Helversen, 1989, *Articulata*, 4: 28.

Material studied. Bolu Prov., Kartaltepe, 1950-2050 m, 9 September 2000, 1 female; 5 October 2000, 1 male; 5 km N. of Kartaltepe, 1700 m, 9 September 2000, 2 males 9 females.

Distribution. Distributed in S. Balkans and N.W. Turkey. Recorded from Bolu Province by Helversen (1989).

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